

ZOOGEOGRAPHY OF TWO NEOTROPICAL SIBLING SPECIES OF CHAULIOGNATHIDAE WITH A REDESCRIPTION OF THE SPECIES

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ABSTRACT

Two sibling species of *Chauliognathus* range from southern Mexico through Central America to northwestern South America as far south as Bolivia and eastward into Venezuela. A zone of species overlap occurs at the Cordillera de Talamanca in Costa Rica. A model is presented describing origin and dispersion of the species in light of current concepts of plate tectonics. The species are redescribed and compared with other members of the genus.

INTRODUCTION

Neotropical Chauliognathidae are rather poorly known, although Central American forms have been studied by Gorham (1881, 1885), Champion (1914), and Miskimen (1966). During my studies of the group, a number of museum collections, plus field collecting, provided sufficient specimens to reveal some interesting relationships between 2 widespread species of southern Mexico, Central America, and the northwestern region of South America.

The first of these species, *Chauliognathus pallidus* Waterhouse (1878), is distributed from southern Mexico south of the Mexican Plateau to Costa Rica, while the second species, *C. cinguliventris* Erichson (1847), is relatively abundant from Costa Rica southward along the Andean Mountain system to Bolivia and eastward into the Cordillera de Merida and llanos of Venezuela. The 2 species were not distinguished by Gorham (1881, 1885) nor by Champion (1914) although each listed *C. pallidus* as ranging from Mexico southward into Panama. *C. cinguliventris* has previously been described as from Peru by the original author and by Blackwelder (1945), the latter listing *pallidus* from Colombia as well as its actual range.

The 2 species represent very closely related siblings that differ superficially only in the presence of postero-lateral brownish-black or black maculae on the fifth abdominal tergite that may in some specimens be expanded to form a continuous band encompassing both sternite and tergite. Aedeagi are identical, except for a small but consistent conformational difference of the right paramere (Fig. 1 and 2).

ORIGINS AND ZOOGEOGRAPHY

C. pallidus and *cinguliventris* are clearly more closely related than virtually any other pair of New World Chauliognathidae as evidenced by aedeagal similarity in a group where genitalic characters are highly diagnostic. Differentiation of the 2 species appears to have been a relatively recent occurrence.

The following model, describing possible origin and subsequent distribution of the species, is based primarily upon historical geological factors plus closeness of species affinities. Relationships between members of *Chauliognathus* elsewhere suggest that ancestral forms arose as forest-adapted carnivores on the primeval Gondwanaland continent. At some time after South America separated from the continent, an element or elements of the Neotropical fauna evolved adult phytophagous habits. The Cretaceous period appears to be the most logical time for this event, since angiosperm radiation was rapid at that time. The known upper Cretaceous land bridge between North and South America apparently permitted northward dispersal of members of the genus as evidenced by known *Chauliognathus* species from Colorado Florissant deposits that are regarded as upper Oligocene or Miocene (Scudder 1876, Wickham 1909). Further species exchange between North and South America was effectively prevented from late Eocene to late Miocene or early Pliocene by the Bolivar geosyncline, a 60 to 100 mile wide seaway, formed during initial stages of the Andean orogeny, that separated the Darien of Panama from continental South America (Olsson 1932, Nygren 1950).

West of the Bolivar trough, the San Blas region of Panama is believed to have been a relatively stable island throughout much of the Cenozoic Era. It was periodically connected with land elements of the Isthmian Panama-Costa Rica-southern Nicaraguan marine portal zone. North of the latter portal, paleontological evidence suggests a more or less continuous land mass leading to North America proper (Whitmore and Stewart 1965). Finally, in late Miocene and early Pliocene, the marine portals were closed uniting North and South America and remain so today. In addition, and important to development of the proposed speciation-distribution model, the Cordillera de Talamanca, located in Costa Rica and northwestern Panama, was uplifted at the same time.

Considering present distribution and historical water barriers and drier habitat preferences of *C. pallidus*, it seems likely that a population of that species became isolated during uplift of the Cordillera de Talamanca. Sufficient divergence occurred to produce the distinct species, *cinguliventris*, that was first able to dominate the wetter uplands of the Cordillera and then was able to traverse the lowland Panamanian rainforest because of moist habitat adaptation and was able to extend its range into South America via the Andes Mountains. Northward distribution apparently has not been possible due to drier general habitat situations and to niche occupation by *pallidus*, which, in turn, has not been able to cross the lowland rainforest barrier of eastern Panama and the west coastal region of Colombia.

A zone of species overlap exists in the Meseta Central-Cordillera de Talamanca region of Costa Rica where *cinguliventris* is more common than *pallidus*. No intermediate forms, suggesting possible hybridization, are known from this area despite extensive collecting. It seems possible that the sternal maculae may serve as a visual clue for species discrimination in nature.

Both *pallidus* and *cinguliventris* may be found in a variety of forested and ruderal habitats. Using the Holdridge (1947) system of plant formation and life zone classification; *pallidus* ranges in a wide variety of tropical to subtropical to lower montane dry and moist forest habitats at altitudes from near sea level to 2000 m, while *cinguliventris* is consistently found in somewhat wetter situations including wet and rainforests. Increasing environmental disturbance, particularly by paved roads, appears to be contributing to range

extension and abundance of both species due to more available host plants along roadsides. Adults congregate primarily on host plants of the family Compositae (*Baccharis* and *Eupatorium* spp. are common hosts) and Ammiaceae. Both species may be regularly taken at light in small numbers. The species are apparently univoltine and appear near the end and after the primary rainy season from October or November until as late as April or May, depending upon altitude. Temporal distribution patterns in mountainous regions generally follow those described for another related species, *Chauliognathus proteus* Gorham (Miskimen 1972).

SPECIES REDESCRIPTION AND DIAGNOSIS

Chauliognathus pallidus Waterhouse

Chauliognathus pallidus Waterhouse 1878:330. Type: Mexico.

Chauliognathus oedemeroides Gorham 1881:73. Type: Mexico.

Chauliognathus fuscescens Gorham 1881:73. Type: Mexico.

Yellowish; antennae and palpi brownish-black; elytral bases with a narrow brownish-black band of varying width beginning centrally and extending to the lateral and sutural margins; distal third of femora, tibiae, and tarsi brownish-black. Length: males 12-15 mm, females 14-18 mm (head extended).

Head and pronotum semiopaque with a very short coarse vestiture; pronotum quadrate in males, slightly transverse in females, anterior angles rounded, lateral edges shallowly reflexed; elytra parallel, semiopaque, slightly rugose with short inclined hairs.

Aedeagus: penis slender, apex produced somewhat forming rounded triangulate tip, genital opening partially covered by a flap with a membranous suture extending to base of penis; right paramere flattened, in profile narrower

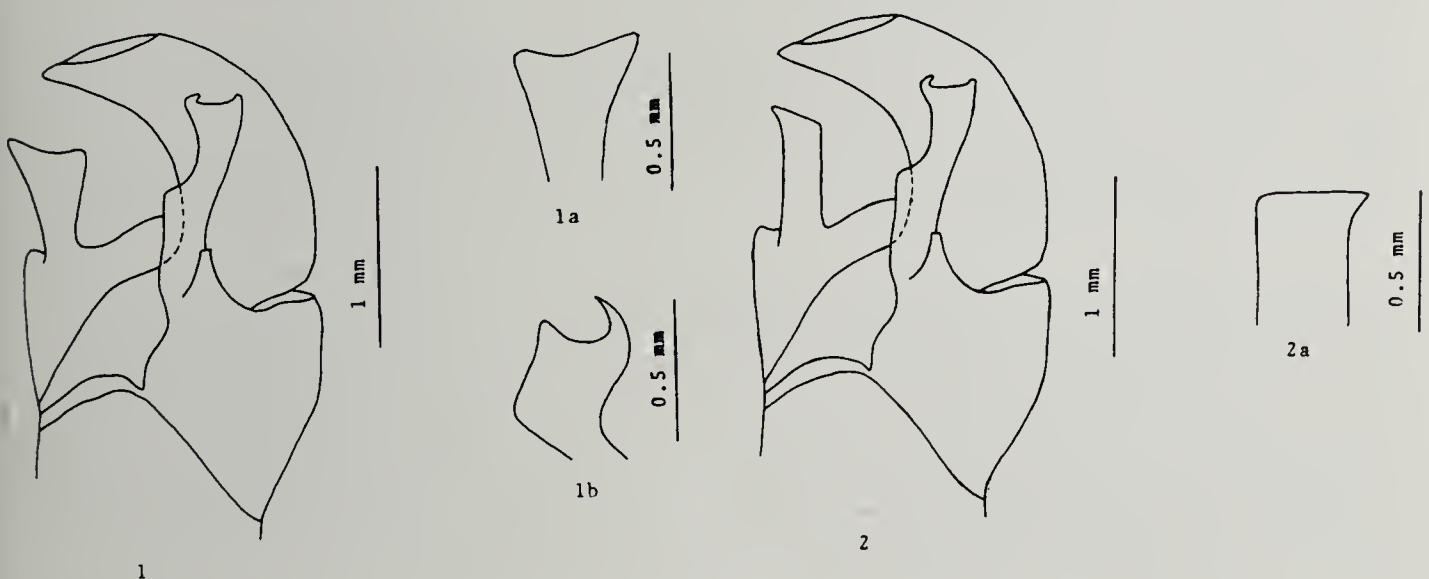


Fig. 1. *Chauliognathus pallidus* Waterhouse: 1) left dorso-lateral aspect of aedeagus; 1a) profile of right paramere tip; 1b) caudo-ventral aspect of left paramere tip.

Fig. 2. *Chauliognathus cinguliventris* (Erichson): 2) left dorso-lateral aspect of aedeagus; 2a) profile of right paramere tip.

at base expanding to notched tip; left paramere flattened, bent, and expanded apically forming truncate tip armed with a curved hook at one end and a tooth at the other (Fig. 1, 1a, and 1b).

Variation in the right paramere tip of the aedeagus and lack of maculae on the fifth abdominal segments distinguish *pallidus* from its southern sibling *cinguliventris*. *Chauliognathus sulphureus*, a similar appearing species is a distinct sulfur yellow, has less prominent eyes, and coarse erect pronotal hairs as well as substantial aedeagal differences. The synonyms described by Gorham describe minor color differences within the limits of the redescription given above. Climatically induced color variation in *Chauliognathus* is discussed by Miskimen (1972).

Chauliognathus cinguliventris (Erichson)

Callianthia cinguliventris Erichson. 1847:83. Type: Peru.

Yellowish; antennae and palpi brownish-black; elytral bases with a brownish-black band of varying width beginning centrally and extending to lateral and sutural margins; distal third of femora, tibiae, and tarsi brownish-yellow; fifth abdominal tergite with postero-lateral brownish-black to black maculae that may in some specimens be expanded to form a continuous belt encompassing both tergite and sternite. Length: males 12-15 mm, females 14-18 mm (head extended).

Head and pronotum semiopaque with very short coarse vestiture; pronotum quadrate in males, slightly transverse in females, anterior angles rounded, lateral edges shallowly reflexed; elytra parallel, semiopaque, slightly rugose with short inclined hairs.

Aedeagus: penis slender, apex produced somewhat forming rounded triangulate tip, genital opening partially covered by a flap with membranous suture extending to base of penis; right paramere flattened, tip truncate with small angular tooth extending dorsad; left paramere flattened, bent, and expanded apically forming truncate tip armed with a curved hook at one end and a tooth at the other (Fig. 2, 2a).

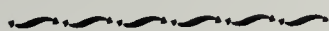
Conformation of the right paramere tip of the aedeagus and markings on the fifth abdominal segment differentiate *cinguliventris* from the northern sibling *pallidus*. The only other species with which *cinguliventris* can be confused, *Chauliognathus sulphureus* Waterhouse, can be distinguished on the same basis cited above for *pallidus*.

Forms with the entire fifth abdominal segment black-banded are the only deviation known from the much more common type with simple postero-lateral tergal markings. Banded forms are known only from Peru where the more common type is also found. I feel that the banded type may be the consequence of environmental conditions (cool, high humidity) inducing expression of this characteristic in a manner similar to that described by me (1972) for *Chauliognathus proteus* Gorham in Colombia.

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Coleopterists Newsletter, (Cont. from p. 34)

5.3 Treasurer Erwin submitted the appended report, which was audited by Don Anderson and Ginter Ekis. He hopes finances will allow an increase in the Bulletin this year by \$250 per issue. The question was raised about the payment to the Inkblot Co. The treasurer explained that Woodruff's children put the Bulletins into envelopes and arranged the zip codes for mailing and handle preparing, billing, and mailing separates, much less expensively than at the printers. These expenses are expected to be nearer \$200 this year as Mrs. Woodruff is paid for secretarial work and taking the Bulletins to the post office. With this explanation, Terry moved the report be accepted. Harley Brown seconded. The vote was carried.

5.4 Newsletter Editor O'Brien reported that he had an overwhelmingly favorable response to including the Newsletter with the Bulletin. His one correspondent approved fully! Material should be received a month and a half before the issue is to appear; e.g., by April 15th for the June Newsletter. This allows 2 weeks for editing and transmittal to Gainesville, and one month in the printer's hands. Again, please send notes of new techniques, discoveries, or travels, etc. It was asked whether we had a tax-exempt status to allow us to apply for reduced mailing fees yet. Erwin reported that he and Gordon are still filling out forms.

6. Reports from committees.

6.1 Nomination and elections committee (Dybas, Whitehead, Hardy). Alan Hardy announced our new president is John Lawrence; Vice President, Paul Ritcher; Secretary, Bob Gordon; and Treasurer, Terry Erwin. New council members are Milton Campbell, John Chemsak, and Lee Herman.

6.2 Catalogue Committee (Kingsolver). John Kingsolver reported that the